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ASSESSMENT AND TREATMENT OF PROBLEM BEHAVIOR OCCASIONED BY INTERRUPTION OF FREE-OPERANT BEHAVIOR

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The current study describes the assessment and treatment of the problem behavior of 3 individuals with autism for whom initial functional analysis results were inconclusive. Subsequent analyses revealed that the interruption of free-operant behavior using "do" requests (Study 1) as well as "do" and "don't" requests (Study 2) occasioned problem behavior. Initially, treatment involved differential and noncontingent reinforcement without interruption. To make the intervention more sustainable in the natural environment (where interruptions are unavoidable), a two-component multiple-schedule arrangement was used to progressively increase the period of time in which ongoing activities would be interrupted. During generalization sessions, the intervention was applied across a variety of contexts and therapists.

DESCRIPTORS: "do" requests, "don't" requests, motivating operations, establishing operations, extinction, multiple schedules

Functional analysis (e.g., Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) has had a considerable impact on our ability to assess and treat aberrant behavior through the identification of maintaining environmental variables. Measurement of problem behavior under several analogue conditions, each designed to examine the effects of particular consequences, permits clinicians to make empirically based conclusions about the variables that maintain problem behavior. In some cases, however, problem behavior may not occur during functional analysis, or may occur inconsistently within and across analogue conditions. Although undifferentiated patterns of responding during functional analysis can occur for a number of reasons, some research has suggested that fluctuations in motivating operations (MOs) can greatly affect responding (Kennedy & Meyer, 1996; McComas, Thompson, & Johnson, 2003; O'Reilly, 1995, 1997; Smith, Iwata, Goh, & Shore, 1995). Motivating operations are "environmental events, operations, or stimulus conditions that affect an organism's behavior by altering (a) the reinforcing or punishing effectiveness of other environmental events and (b) the frequency of occurrence of that part of the organism's repertoire relevant to those events as consequences" (Laraway, Snycerski, Michael, & Poling, 2003, p. 407).

One reason responding may be low or inconsistent across sessions within an analogue condition is that the relevant MOs may vary across sessions. For example, levels of problem behavior in attention conditions may change as a function of variations in access to attention prior to sessions (McComas et al., 2003). Likewise, the reinforcing value of items selected for use in tangible conditions may vary as a function of presession exposure or other variables that produce momentary shifts in preference. Furthermore, responding may be altered if an establishing operation (EO: a type of MO that momentarily increases the effectiveness of a particular stimulus as a consequence and alters the frequency of the class of behavior that has produced that consequence in the past;

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Laraway et al., 2003) for one reinforcer is present when the role of another reinforcer is under examination. For example, an EO for attention-maintained problem behavior may be present during the escape interval of the demand condition and thereby occasion attention-seeking behavior during demand sessions. Undifferentiated responding or uncharacteristically low levels of responding in the functional analysis may occur as a result of these sorts of fluctuations in MOs.

One way to assess problem behavior that occurs inconsistently during functional analysis involves using client mands to determine what stimuli are reinforcing at any given time. For example, Bowman, Fisher, Thompson, and Piazza (1997) described two cases in which the results of initial functional analyses of severe destructive behavior were undifferentiated. School reports, parental reports, and staff observations suggested that the children manded for a wide-ranging and idiosyncratic list of items or activities that changed over time, and when those mands were not honored, problem behavior was emitted. Based on that information, Bowman et al. developed an analysis of mands wherein levels of problem behavior were compared across two conditions, one in which mands for social interaction were reinforced while problem behavior was ignored (control condition) and one in which mands were not reinforced until problem behavior was emitted (test condition). Levels of problem behavior were consistently higher during the test condition than in the control condition, indicating that incorporating manding as part of the test contingency permitted identification of stimuli that were potent at any given moment.

Another way applied researchers have assessed problem behavior following unclear functional analysis outcomes is by systematically interrupting ongoing activities (Adelinis & Hagopian, 1999; Fisher, Adelinis, Thompson, Worsdell, & Zarcone, 1998). Any activity observed in the context of a free-operant situation can be conceptualized as relatively preferred in that the individual has allocated responding to that activity to the exclusion of other available alternatives. Interrupting free-operant activities may increase the probability that relevant EOs are present during assessment relative to procedures designed to assess one clinician-selected reinforcer.

Fisher et al. (1998) described a procedure that involved interrupting free-operant behavior by presenting an instruction to stop engaging in an ongoing response (i.e., ''don't'' request; ''Don't stand by the window''). Problem behavior emitted following the ''don't'' request resulted in termination of that request and access to the interrupted activity. For both participants, responding was higher in the ''don't'' request condition relative to a control condition in which behavior was not interrupted. During subsequent analyses, Fisher et al. examined the differential effects of issuing ''do'' or ''don't'' requests that were matched for level of gross motor activity (Phase 3) as well as the effects of symmetrical ''do'' or ''don't'' requests that involved the interruption of free-operant behavior (Phase 4). Based on the collective findings of these analyses, the authors concluded, ''whether the demand is phrased as a 'do' or a 'don't' request may be incidental to the probability of compliance or problem behavior, and the critical variable is whether the request interferes with an ongoing high-probability response'' (p. 347).

For both participants, Fisher et al. (1998) implemented FCT with extinction, whereby each participant was trained to terminate ''don't'' requests for 30 s by emitting an appropriate communicative response (handing the therapist a card) while problem behavior was placed on extinction. This intervention was highly effective in reducing problem behavior to clinically acceptable levels in both cases. Although the results of the intervention confirmed the relation between interruptions and

problem behavior, immediate reinforcement of every mand to terminate "don't" requests would be of limited practical utility in the natural environment where interruptions may be frequent and unavoidable. Therefore, additional research is needed to determine if an intervention that targets problem behavior occasioned by interruptions can be effective in contexts that more closely approximate the natural environment.

In the current study (Study 1), initial analogue functional analysis results were inconclusive in that the level or intensity of problem behavior observed was not considered to be representative of those that occurred in the natural environment. In subsequent analyses, the effects of interruptive demands were compared to a control condition without interruptive demands. Initially, treatment involved differential reinforcement of mands and noncontingent reinforcement without interruption. To make the intervention more sustainable in the natural environment, a two-component multiple schedule was used to progressively increase the period of time in which ongoing activities would be interrupted (interruptive demand fading). This method of altering component durations of a multiple schedule as a means of thinning reinforcement was based on procedures described by Hanley, Iwata, and Thompson (2001). Thus, the purposes of Study 1 were to extend the research conducted by Fisher et al. (1998) by conducting an interruption analysis and to develop an intervention that would be effective in situations in which interruptions are frequent and unavoidable. Study 2 extended Study 1 further by including both "do" and "don't" request conditions in the interruption analysis.

STUDY 1

General Method

Participants and Setting

Participants were 2 individuals who had been admitted to an inpatient unit for the assessment and treatment of severe behavior problems. Perry was a 12-year-old boy who had been diagnosed with moderate mental retardation and autism. He was ambulatory and had limited communication using picture cards. His target behaviors included self-injurious behavior (SIB), defined as hitting, scratching, and biting himself; aggression, defined as pinching, scratching, hitting, kicking, and hitting others with objects; and disruption, defined as throwing objects, banging on hard surfaces, and hitting and kicking walls. Maxwell was a 6-year-old boy who had been diagnosed with moderate mental retardation and autism. He was ambulatory and communicated using one- to three-word utterances and gestures. His problem behaviors included SIB, defined as biting his hands and arms, head banging, and slapping his legs; aggression, defined as hitting, kicking, pinching, scratching, grabbing, and throwing objects within 0.5 m of others; disruption, defined as hitting or kicking surfaces and throwing objects further than 0.5 m from others; and screaming, defined as vocalizations louder than conversational level.

Analysis and treatment sessions were conducted in individual treatment rooms equipped with a one-way mirror (3 m by 3 m). Generalization sessions were conducted throughout the main living unit and in various community settings. All sessions were 10 min in length during the analysis and treatment components. Session length varied during generalization.

Data Collection and Interobserver Agreement

Frequency data were collected on the target problem behaviors using laptop computers and are presented as average responses per minute. For Perry, interobserver agreement was collected for 28% of functional analysis sessions, 40% of sessions during the interruption analysis, and 42% of treatment and generalization sessions. For Maxwell, interobserver agreement was collected for 50% of functional analysis sessions and 30% of sessions across the interruption

analysis and the subsequent treatment evaluation and generalization phases.

Exact agreement was calculated by dividing the number of exact agreements per 10-s interval by the number of exact agreements plus disagreements and multiplying by 100%. An exact agreement was defined as both observers recording the same frequency of a target response during a 10-s interval. Average exact agreement coefficients for targeted problem behavior were 98% during the functional analysis, 96% during the interruptive demand analysis, and 98% during the treatment and generalization sessions for Perry. Average exact agreement coefficients for targeted problem behavior were 99% for functional analysis and 83% for treatment and generalization sessions for Maxwell. The interruptive demand evaluation was not conducted as a separate assessment for Maxwell; therefore, interobserver agreement for the initial three phases of the analysis and treatment evaluation is presented with the treatment and generalization sessions.

Experimental Design

The functional analysis for each participant was conducted using a multielement design. The interruption analysis was conducted using either a pairwise (Perry) or a reversal (Maxwell) design. The treatment analyses were conducted using reversal designs (ABAB). During the generalization phase, the intervention was applied across other settings, by other persons (e.g., parents), and for extended durations.

Functional Analysis

Procedure

A functional analysis was conducted for both participants, based on procedures described by Iwata et al. (1982/1994). During the attention condition, the participant was given adult attention in the form of a brief statement of concern contingent on the occurrence of a target behavior. This condition was designed to evaluate the role of attention in the maintenance of problem behavior. A tangible condition was conducted during which the participant was provided access to tangible items contingent on the occurrence of problem behavior. The purpose of this condition was to evaluate the role of tangible items in the maintenance of problem behavior. The demand condition (Perry only) consisted of providing instructional demands using a three-step guided-compliance prompting sequence. Compliance resulted in praise. Perry received a 30-s escape from demands contingent on the occurrence of a target behavior. This condition was designed to evaluate the role of escape from demands in the maintenance of problem behavior. During the ignore condition (Perry only), the participant was in the room with the therapist and no toys were present. During the toy play condition, toys were available, the therapist provided attention every 30 s, and no instructional demands were given. This condition was designed to serve as a control against which the other conditions could be compared. No differential consequences were provided for targeted problem behavior during the ignore and control conditions.

Results

The results of the functional analysis for Perry (Figure 1) were inconclusive. Problem behavior (SIB, aggression, and disruption) was at or near zero in all but 2 of 18 sessions. Significant levels of problem behavior were emitted during two sessions of the demand condition; however, it should be noted that ongoing high rates of problem behavior were observed prior to the final demand session, apparently occasioned by interruption of an activity to transition to the demand session. Anecdotal observations suggested that Perry frequently became agitated and displayed aggression when interrupted from engaging in ongoing activities. These observations led to the formulation of hypotheses that were tested during a subsequent interruption analysis (described below).

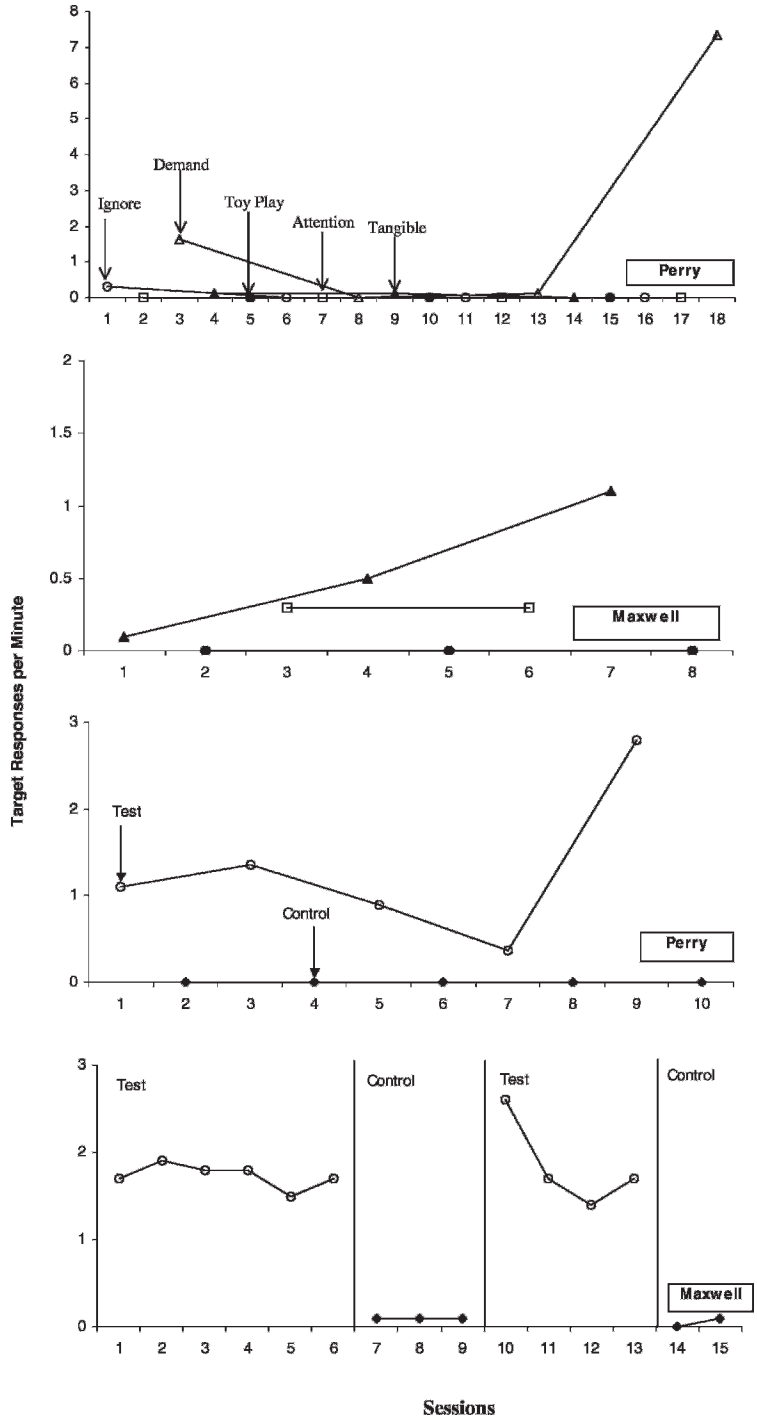

Figure 1. Functional analysis (top two panels) and interruption analysis (bottom two panels) results for Perry and Maxwell.

Maxwell displayed low levels of problem behavior in the tangible and attention conditions; no problem behavior was observed in the control condition (Figure 1). The frequency and intensity of problem behavior observed during the functional analysis were uncharacteristically low and were not representative of his behavior in other contexts. Although functional analysis indicated that problem behavior was maintained by access to attention and tangible items, observations of interactions between Maxwell and his mother suggested that interruption of ongoing activities occasioned problem behavior. Therefore, the functional analysis was terminated after only eight sessions, and a subsequent analysis within the treatment evaluation was conducted with his mother acting as therapist (described below).

Interruption Analysis

Procedure

During the test condition, the participant was given free access to preferred stimuli, identified through a preference assessment (Fisher et al., 1992), or could mand for interaction with the therapist or for access to other activities or stimuli for approximately 2 min prior to the session. Each participant often specified preferred activities via vocal or gestural mands (i.e., pointing at an object). Every 30 s, the therapist (a) issued a simple ''do'' request that was incompatible with the ongoing activity (e.g., ''stand up'' when the participant was seated or ''walk this way'' when the participant was walking in a different direction) and (b) terminated compliance with client mands and removed stimuli with which the participant was interacting (if necessary). A three-step prompting hierarchy (verbal request, gestural prompt, and physical guidance) was used to prompt compliance with the request. If the participant complied with the request, praise was given. Problem behavior terminated the ''do'' request and the participant was permitted to engage in ongoing activities until the next scheduled interruption (i.e., for 30 s). During the control condition, the participant was permitted to engage in activities of his choosing, interact with stimuli available in the area, and mand for interaction with the therapist. No interruptive demands were issued. The therapist interacted with the participant only when approached and complied with all mands (excluding those that were considered unsafe). All problem behaviors were ignored.

Results

The results of the interruption analyses for both participants are depicted in the two bottom panels of Figure 1. For both participants, differential rates of responding were evident between test and control conditions. Whereas problem behavior was at or near zero during all control sessions, higher levels were observed in all test sessions. Mean number of responses per minute for Perry was 0 during the control condition and 1.3 during the test condition. Mean number of responses per minute for Maxwell was 0.1 during the control condition and 1.8 during the test condition.

Treatment Evaluation and Generalization

Procedure

Baseline. The baseline condition for Perry was identical to the test condition of the interruption analysis. For Maxwell, the ABAB interruption analysis was used for the initial treatment analysis.

Treatment. A treatment involving reinforcement of appropriate mands, noncontingent access to preferred stimuli and activities without interruption, and no differential consequences for target behavior was implemented with both participants. After demonstrating the effects of this intervention, interruptive demand fading was initiated to make the intervention more practical to implement in environments in which interruptions are unavoidable. This involved introducing progressively longer periods of time in which (a) ongoing activities were interrupted by issuing ''do'' requests, (b) preferred activities were not available, and (c)

mands were not reinforced. Interruptive demand fading was accomplished using a two-component multiple schedule in which the component durations were altered to thin the schedule of reinforcement as described by Hanley et al. (2001). The first component of the multiple schedule (reinforcement; R) was signaled by a card indicating that the participant could engage in activities of his choosing and mand for interaction with the therapist without being interrupted (e.g., ''Perry's way'' was written on the R stimulus card for Perry). The R component was identical to the initial intervention. The second component (interruptive demand; ID) was signaled by a card indicating that compliance with interruptive demands would result in reinforcement, client mands would not be reinforced, and access to preferred activities and stimuli would be restricted (e.g., ''mom's way'' or ''my way'' was written on the ID stimulus card). Compliance with interruptive demands resulted in social praise and edible items, identified through a preference assessment (Fisher et al., 1992). During both the R and ID components, problem behaviors produced no programmed consequences.

Although the timing of components was individualized for both participants, sessions always began with the R component. The duration of the ID component was increased progressively while the duration of the R component was decreased across sessions. Criteria for increasing the ID component were individualized but usually were based on a 90% or greater reduction in levels of problem behavior relative to baseline for two consecutive sessions.

During the R component, Perry had access to high-preference stimuli (e.g., a television, video, a blanket, and a pillow). A nonalternating multiple schedule was used that involved one R and one ID component. Interruptive demand fading was conducted by increasing the duration of the ID component from 0 to 5 min (while decreasing the R component accordingly). The ID component duration started at 15 s and was increased in 30-s increments until the duration of the ID component was 5 min. A 30-s hands-down time-out (later increased to 60 s) contingent on problem behavior was added to the treatment when problem behavior persisted at levels that were considered clinically unacceptable. The hands-down time-out produced a reduction in problem behavior; however, problem behavior did not increase after the procedure was withdrawn for the final 15 sessions. Therefore, it was not included in the final treatment program.

Maxwell had access to a variety of preferred items available during the R component including a ball, radio and tape player, and action figures. Prior to interruptive demand fading, the R component duration was 10 min and the ID component was 0 min. An alternating multiple-schedule arrangement was used in which the R and ID components alternated throughout the session. Throughout ID fading, the R component duration remained at 1 min and alternated with the ID components that were increased as follows: 10 s, 30 s, 1 min, 1.5 min, 2 min, 2.5 min, 3 min, and 4 min. Thus, at the end of the analysis, the session involved alternating between 1 min of R and 4 min of ID. A 1-min exclusionary time-out for problem behavior was implemented at Session 55 because consistently low levels of problem behavior could not be maintained. The time-out component was faded to a nonexclusionary time-out during generalization (see below). The exclusionary time-out consisted of removing Maxwell from the immediate area and directing him to either a time-out room or an isolated area. The nonexclusionary time-out consisted of keeping Maxwell in the area but not allowing him to participate in activities. A color-coded card that said ''time-out'' was presented to Maxwell during nonexclusionary time-out periods.

Generalization. After reaching the terminal schedule for both participants, the intervention was extended to other settings and therapists

and was applied over longer periods of time. It was also necessary to teach each participant that certain activities were not permissible at any time (including during the R component). Impermissible activities included playing with other children's personal belongings, moving items to inappropriate locations, opening doors that were not appropriate to open, and attempting to leave the living unit. When a participant attempted to engage in an impermissible behavior during the R component, the ID stimulus card was presented, the impermissible behavior was blocked (i.e., the therapist positioned his or her body between the client and the item), and the therapist said, "It's my way, you can't do that."

For Perry, the treatment was implemented on the main living unit beginning at Session 155, and additional ID fading was conducted between Sessions 181 and 185. The ID component increased to 7.5 min and the R component remained at 5 min beginning at Session 181. The ID component increased to 10 min and the R component remained at 5 min beginning at Session 185. Session duration increased from 15 min to 35 to 50 min beginning at Session 204, and activities from Perry's daily schedule (i.e., snack time, meal preparation, bathroom trips, etc.) were introduced during the ID component to approximate more closely his regular routine. When session duration was increased to 35 to 50 min, the R and ID components alternated (but remained at 5 and 10 min, respectively). During generalization, stimuli previously determined to occasion ritualistic or problem behavior and other impermissible activities (e.g., a videotape box, other patients' toys) were gradually introduced into the session. If he requested any of the items or otherwise tried to engage in an impermissible activity, the ID stimulus card was presented as described above, and the impermissible behavior was blocked.

Initially, Maxwell's mother was present in the room while the therapist implemented the treatment, and sessions were conducted in the same location as the treatment evaluation. During the generalization phase (starting at Session 68), Maxwell's mother was introduced into the sessions. She began assisting the therapist with certain components of the treatment and eventually implemented the entire treatment independently. Sessions were then conducted in other locations starting at Session 73. To make the intervention more practical to implement outside the hospital, the 1-min exclusionary time-out was faded to a room corner time-out, then to a nonexclusionary time-out, and finally to a time-out card paired with loss of access to preferred stimuli and attention.

Results and Discussion

The results of Perry's treatment analysis are depicted in Figure 2. Problem behavior (SIB, aggression, and disruption) occurred at an average rate of 1.3 per minute across five baseline sessions. With the introduction of treatment, problem behavior decreased to zero for three consecutive sessions. Baseline rates were recovered when baseline contingencies were reinstituted, and treatment effects were replicated when treatment was reimplemented. Levels of problem behavior were variable during ID fading; however, the terminal schedule (5 min R and 5 min ID) was achieved at Session 52. Problem behavior decreased by 84% during the last 15 treatment sessions, relative to baseline.

Generalization results for Perry are depicted in Figure 2. Relative to baseline, an 80% reduction in problem behavior was observed across generalization sessions. During the last 12 generalization sessions, there was a 94% reduction in problem behavior.

The results of the treatment analysis for Maxwell are depicted in Figure 3. The initial ABAB phases of this analysis represent the interruption analysis sessions described earlier. During baseline, problem behavior (SIB, aggression, disruption, and screaming) was stable

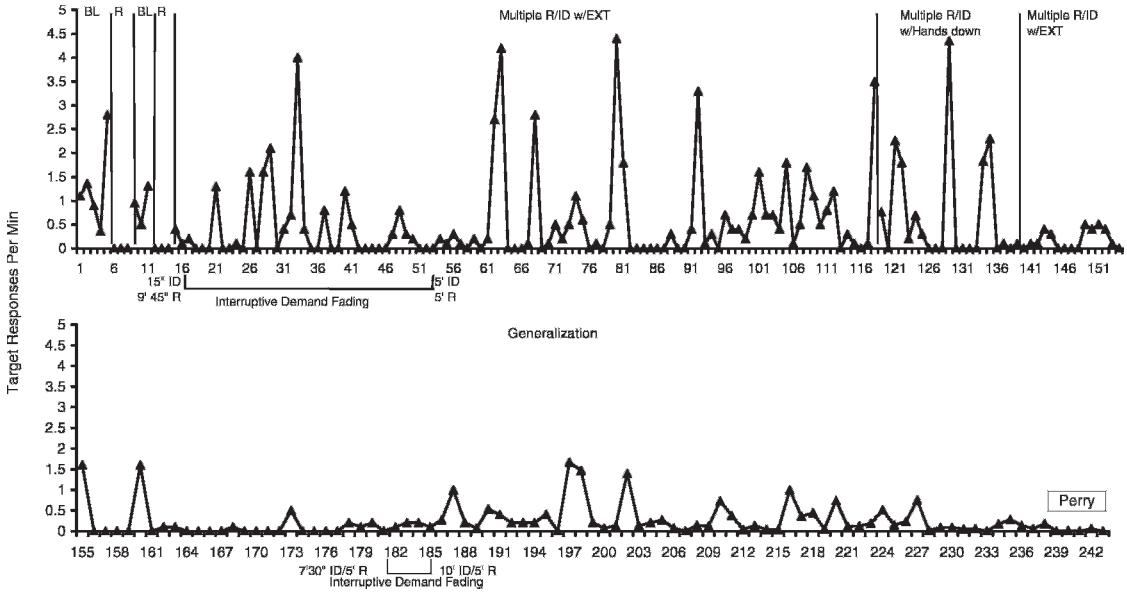

Figure 2. Treatment analysis (top) and generalization (bottom) for Perry.

across sessions, occurring at a rate of 1.7 per minute. Treatment produced dramatic reductions in problem behavior (M = 0.1 per minute), and baseline rates recovered during a reversal to baseline. Treatment effects were then replicated, and ID fading was initiated. Responding was generally low but variable during ID sessions. However, in the final session of this condition, high levels of problem behavior were observed. A time-out component was added to the treatment following one session in which very high levels of severe and

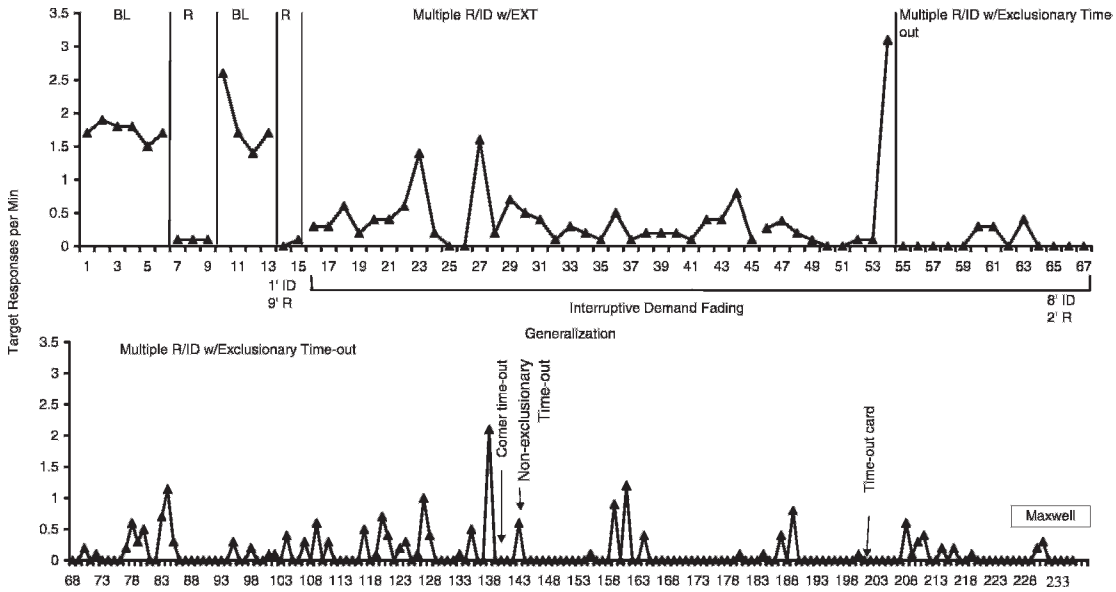

Figure 3. Treatment analysis (top) and generalization (bottom) for Maxwell.

highly dangerous behavior were observed. Problem behavior immediately decreased and remained at low levels, permitting the completion of ID fading. Problem behavior decreased by 96% with the 1-min time-out component in place, relative to baseline.

Generalization results for Maxwell are depicted in Figure 3. Sessions were conducted in other areas of the hospital and with other therapists, and Maxwell's mother was gradually faded into sessions. Eventually, Maxwell's mother conducted entire sessions. The exclusionary time-out procedure was systematically faded to a 30-s time-out card. Finally, sessions were conducted in situations that Maxwell's mother identified as most problematic in the past. This included conducting sessions in the hospital cafeteria during lunchtime, in a mall, and at a grocery store. Problem behavior remained at low levels throughout the majority of generalization sessions. Relative to baseline, a 97% reduction in problem behavior was observed during the final 35 sessions under the terminal schedule with the time-out card in effect.

Observations of these participants suggested that interruption of ongoing activities with a demand to engage in an incompatible behavior (e.g., telling the child to wash up for lunch while he was watching television) consistently occasioned problem behavior. Results of an interruption analysis revealed that the interruption of an ongoing, and presumably preferred, activity resulted in consistently higher levels of problem behavior relative to a control condition without interruptions. Treatment involved no differential consequences for problem behavior, discriminative stimuli to signal when the participant could engage in preferred activities and when he could not, and ID fading. The initial phase of treatment was similar to the interventions described by Bowman et al. (1997) and Fisher et al. (1998) that involved immediate reinforcement of mands and free access to preferred activities. Results were comparable across these three studies in that rates of problem behavior were reduced to near zero when access to preferred activities was continuous and mands were immediately reinforced.

Although this intervention was effective, it is of limited practical utility because it is not possible to support such a rich schedule of reinforcement in the natural environment. To make the intervention more practical, we interrupted free-operant behavior and introduced periods of time in which preferred activities were not available, mands were not reinforced, and interruptive demands were issued. This was accomplished by progressively increasing the duration of the ID component while decreasing the duration of the R component over the course of treatment within a multiple-schedule arrangement (as described by Hanley et al., 2001). In addition, participants were exposed to situations in which mands that were considered socially inappropriate or dangerous were not reinforced during the R component, and the interventions were implemented across settings and therapists and for extended periods of time during the generalization phase. Thus, the current study extends the work of Fisher et al. (1998) by improving the ecological validity of the treatment package.

One limitation of Study 1 is that few demand sessions were conducted during the functional analyses (four sessions for Perry and no sessions for Maxwell). Demand sessions were not conducted with Maxwell because his school staff reported no problems during his academic instruction. Unfortunately, this resulted in limited evidence supporting the nonexistence of an escape function. A second and related limitation of Study 1 is that only "do" requests were issued during the interruption analyses. We issued only "do" requests based on parental report; Perry's and Maxwell's parents reported that problem behaviors occurred when it was necessary to transition from a preferred activity.

Nevertheless, it is possible that problem behavior observed during the interruption analyses was maintained by escape from demands (i.e., negative reinforcement) rather than by regaining access to the interrupted activity (i.e., positive reinforcement). These limitations were addressed in Study 2. That is, a functional analysis was conducted that included a demand condition to rule out an escape function. In addition, the interruption analysis included both "do" and "don't" request conditions to determine whether problem behavior occurred to escape the demand or to regain access the interrupted activity.

STUDY 2

General Method

Participant and Setting

Kelly was a 12-year-old girl who had been diagnosed with autism, cerebral palsy, and a seizure disorder. She had been admitted to an inpatient unit for the assessment and treatment of a severe behavior problem. She was ambulatory and communicated using four- to five-word utterances. Her problem behavior was aggression, defined as pulling hair, pinching, hitting, and kicking. Analysis, treatment, and generalization sessions were conducted as in Study 1.

Data Collection and Interobserver Agreement

Frequency data were collected on the target problem behavior during the functional analysis, interruption analysis, and treatment evaluation and generalization sessions, and are presented as average number of responses per minute. Interobserver agreement was collected for 59% of sessions during the functional analysis, 28% of sessions during the interruption analysis, and 49% of sessions during the treatment and generalization sessions. Exact agreement was calculated as in Study 1. Average exact agreement coefficients for targeted problem behavior were calculated for the functional analysis, interruption analysis, and treatment and generalization sessions. Average exact agreement coefficients were 100%, 93%, and 100%, respectively.

Experimental Design

The functional analysis was conducted using a multielement design, the interruption analysis was conducted using a pairwise design, and the treatment analysis was conducted using a reversal design (ABAB). After ID fading was completed, the intervention was applied across other settings, by other persons (e.g., her mother), and for extended durations during the generalization phase.

Functional Analysis

Procedure

Functional analysis procedures were identical to those conducted with Perry (see Study 1). Five conditions (demand, attention, tangible, ignore, and toy play) were conducted.

Results

The results of the functional analysis (Figure 4) showed zero or near-zero occurrences of problem behavior in all sessions. However, Kelly's mother reported that she was most likely to engage in problem behavior when preferred activities were interrupted. An interruption analysis was conducted to determine if interruptions occasioned Kelly's problem behavior.

Interruption Analysis

Procedure

The interruption analysis was identical to those conducted with Perry and Maxwell, with one exception. In addition to interruptions with "do" requests, an analysis of the effects of interruption with "don't" requests (instructing her to no longer engage in her current activity) also was conducted. For example, she was told, "You can't play with that toy anymore" or "You can't sit here." "Don't" requests were used in addition to "do" requests based on Kelly's mother's report that problem behaviors tended to occur when she had to leave

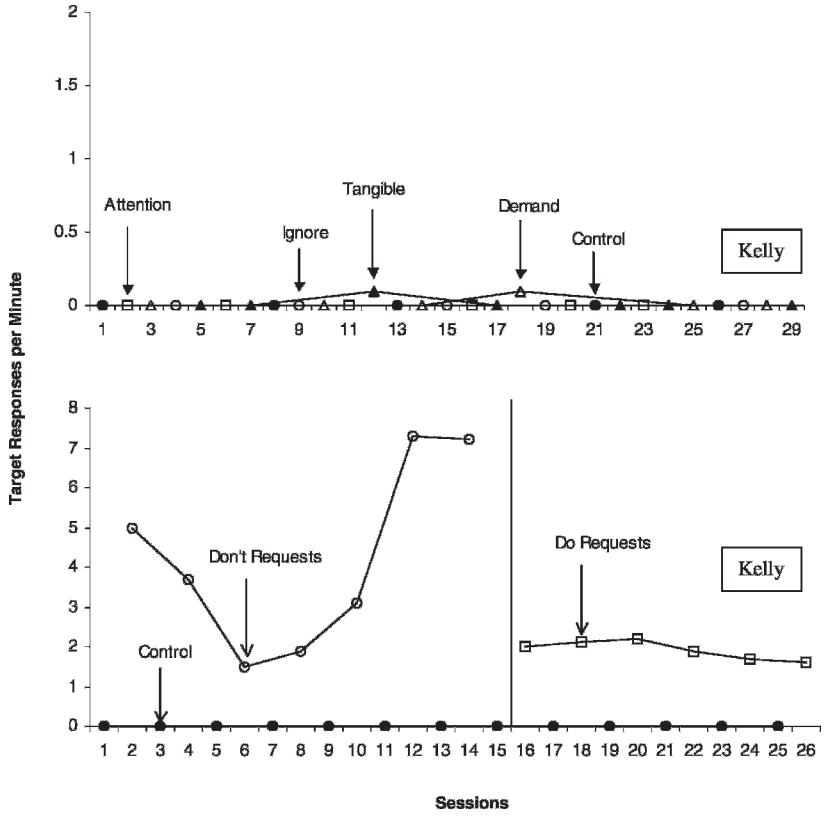

Figure 4. Functional analysis (top) and interruption analysis (bottom) for Kelly.

a preferred activity whether or not she had been given a demand to engage in another activity.

Results

The results of the interruption analysis for Kelly are depicted in Figure 4. No aggression was observed during control sessions. During the test condition, aggression was emitted 4.2 times per minute when "don't" requests were issued and 1.9 times per minute when "do" requests were issued.

Treatment Evaluation and Generalization

Baseline

Although Kelly displayed problem behavior in both the "do" and "don't" request conditions of the interruption analysis, "don't" requests were used during the treatment analysis based on her mother's report that interruptions with "don't" requests better simulated situations in which she had more difficulties at home and in the community. Thus, the baseline condition was identical to the interruption analysis using "don't" requests.

Treatment

Treatment sessions were similar to those conducted with Perry and Maxwell in that reinforcement of appropriate mands, noncontingent access to preferred stimuli and activities without interruption, and no differential consequences for target behavior were provided. After demonstrating the effects of this intervention, ID fading was initiated. Ongoing activities were interrupted by "don't" requests for progressively longer periods of time, preferred activities were not available, mands were not reinforced, and problem behavior received no differential consequences. ID fading was accomplished using a two-component multiple-

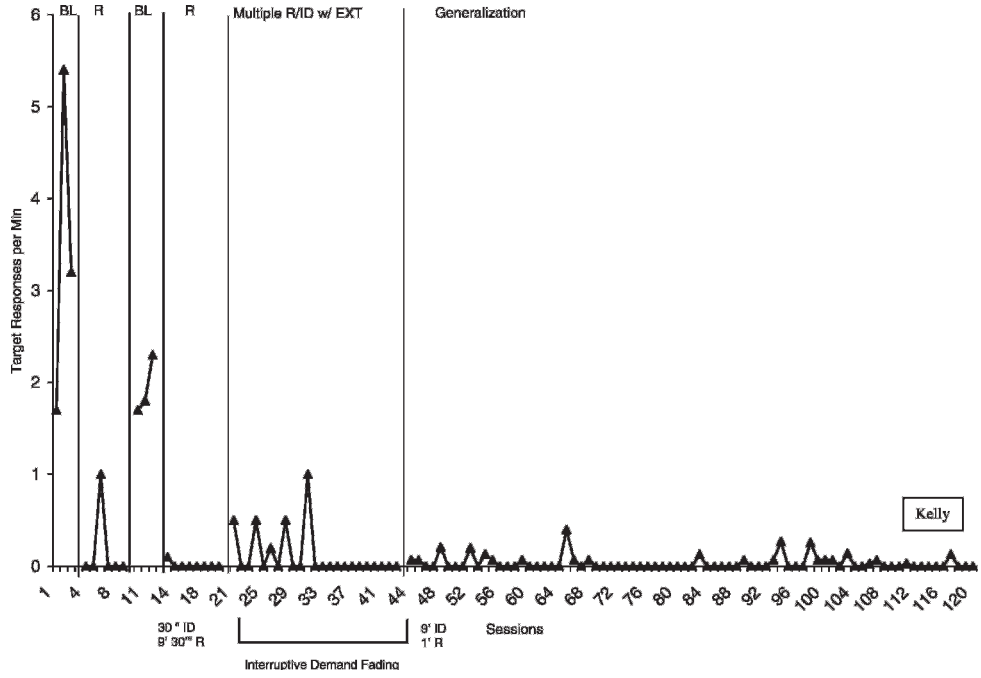

Figure 5. Treatment analysis for Kelly.

schedule arrangement similar to the schedules used with Perry and Maxwell. Stimulus cards were associated with each component. During the R component, Kelly had access to a variety of preferred stimuli, including paper and scissors, a coloring book and crayons, a keyboard, Play-doh®, and musical books, and no interruptions occurred. In the ID component, compliance with interruptive demands produced reinforcement, mands were not reinforced, and access to preferred activities and stimuli was restricted.

During ID fading, the number and duration of the ID components were increased and dispersed evenly across the 10-min session as follows: one 30-s component, two 30-s components, four 30-s components, three 1-min components, two 2-min components, and one 4-min component; thereafter, a single ID component was operative and the duration increased by 1 min up to the terminal duration of 9 min. Thus, at the end of the analysis, the ID component duration was 9 min and the R component was 1 min. Schedule parameters were faded based on a 90% reduction below baseline levels for two consecutive sessions.

Generalization. Beginning at Session 44, the session length was increased to 15 min, keeping the ID component at 9 min and increasing the R component to 6 min. At Session 46, sessions were moved onto the main living unit. Session length was further increased to 30 min (Session 104) and 45 min (Session 117). During the ID component, a variety of tasks that were similar to those required at home (e.g., household chores and daily living activities) were integrated into the session. In addition, between Session 98 and Session 103, Kelly's mother helped the therapist implement treatment components and was present throughout the entire session.

Results

The results of Kelly's treatment analysis are depicted in Figure 5. During the initial baseline, aggression occurred an average of 3.4 times

per minute. When the initial treatment was introduced, aggression decreased to 0.17 responses per minute over six sessions. Reversals replicated these outcomes. During ID fading, aggression remained low, and the terminal schedule (9 min ID and 1 min R) was achieved by Session 43. Compared to baseline, there was a 96% reduction in aggression across all treatment sessions.

Aggression remained low during the generalization phase, occurring at an average of 0.04 per minute. This represents a 99% decrease in aggression across the generalization sessions relative to baseline.

GENERAL DISCUSSION

For 2 of the 3 participants (Perry and Kelly), the functional analysis outcomes were inconclusive because these participants displayed zero or near-zero behaviors during most of the analysis. For Maxwell, the functional analysis results suggested that problem behavior was maintained by access to tangible items and attention; however, the rate and intensity of problem behaviors observed in the functional analysis were not representative of his behavior outside the sessions. Outside the functional analysis sessions, we observed that interruptions of ongoing activities occasioned problem behavior for all 3 participants. These observations led us to conduct analyses to examine this hypothesis.

The interruption analysis performed in Study 1 did not permit a determination of whether or to what extent problem behavior observed in the interruption analysis was maintained by positive or negative reinforcement (i.e., access to the interrupted activity or escape from a demand, respectively). Therefore, in Study 2, a ''don't'' request condition was conducted with Kelly to examine the roles of positive and negative reinforcement. Kelly engaged in aggression following both ''do'' and ''don't'' requests, suggesting that problem behavior was maintained by termination of interruption.

For the treatment analyses with Perry and Maxwell, a ''do'' request condition was used because we considered this to be a better analogue of the natural environment based on parent report. Thus, it is possible that both positive and negative reinforcement may have been operative during the analyses for Perry and Maxwell. For Kelly's treatment analysis, we used a ''don't'' request based on her mother's report that Kelly was more likely to have difficulty when interrupted from an activity.

One limitation of this study is that the intervention included several treatment components; thus, it is not possible to determine the contribution of each to the outcomes. Although problem behavior was reduced to very low levels during the initial phases of treatment for all participants, punishment was necessary to maintain clinically acceptable reductions in problem behavior during generalization and ID fading for 2 participants. However, punishment was eliminated for Perry and was faded to a time-out card for Maxwell. Despite these limitations, the current study supports and extends previous research related to problem behavior that is occasioned by interruption (Fisher et al., 1998) by implementing a demand fading procedure that made the treatment more practical to implement in the natural environment and transferring the intervention across settings, people, and time.

Additional research is needed to further explore the mechanisms involved in the interruption of preferred activities. An interruption condition involving ''do'' requests may have elements of both positive and negative reinforcement, in that problem behavior results in termination of the demand as well as access to the interrupted activity. An interruption condition involving ''don't'' requests appears to evaluate more directly the effects of positive reinforcement, in that a preferred activity is removed and then made available contingent on problem behavior. Whereas attention and tangible conditions of

functional analyses assess the effects of a single form of potential reinforcement and are thus strongly affected by variations in MOs associated with those stimuli, the consequences in an interruption analysis are free to vary as a function of current preferences. This type of assessment may be appropriate in cases in which problem behavior appears to be maintained by access to varied and shifting tangible items and activities.

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